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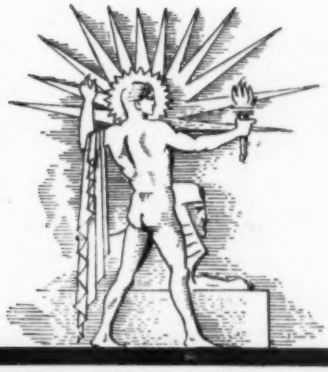
SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE •



June 27, 1942

Tin From Low-Grade Ore

See Page 409

A SCIENCE SERVICE PUBLICATION

Do You Know?

Similar physical properties of the fibers make *milkweed* a potential substitute for kapok.

Some types of .303 British *rifle* are being converted into machine guns by a method invented by a New Zealander.

Over 215,000 tons of food are represented by the *game* animals, game birds, and game fish taken by sportsmen in one year.

Steel *ball bearings* perfected for use in airplane instruments have diameters of less than .04 inch and weigh .000144 ounce each.

The London (England) Passenger Transport Board estimates that by reducing *ticket* thickness .004 of an inch, it will save 480 tons of paper a year.

Spraying with a naphthalene acetic acid solution is said to keep ripened *apples* on trees for ten days to two weeks, so that they may be harvested all at once.

Improved glass-making methods have produced *milk bottles* weighing one-fourth less than the old fashioned bottle and averaging 45% more round trips before they become unusable.

Wild *cotton rats,* caged together, refused to mate and fought to the death until laboratory workers made them "smell alike" by dipping both male and female in a creosote bath; then there were no further rat fights.

Fuel tanks on one training plane type are now made of wood.

Sheep *intestines* are used to make surgical sutures, commonly called catgut.

The *synoptophore,* an ingenious instrument used by the Royal Air Force, trains eye muscles to perfect balance so that a pilot can judge height and distance accurately.

Cellulose sponges, derived from cotton or wood pulp, absorb 20 times their weight in water and, because they float, they will not pick up grit from the bottom of a bucket.

A male *swan* is called a cob; a female a pen, and a young swan a cygnet.

Wood cores in a new-type *rubber heel* save 28% of the rubber used formerly.

Aptitude testing, intended to insure that men will be employed in the capacity for which they are best equipped by natural ability, is being introduced into the military forces of Australia.

A common method of filling shells with *TNT* is to heat the explosive, which resembles brown sugar at normal temperatures, to just above its melting point and pour it directly into the shell.

Question Box

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Most articles which appear in SCIENCE NEWS LETTER *are based on communications to Science Service, or on papers before meetings. Where published sources are used they are referred to in the article.*

SCIENCE NEWS LETTER

Vol. 41 JUNE 27, 1942 *No. 26*

The Weekly Summary of Current Science, published every Saturday by SCIENCE SERVICE, Inc., 1719 N St., N. W., Washington, D. C. NOrth 2255. Edited by WATSON DAVIS.

Subscriptions—$5.00 a year; two years, $7.00; 15 cents a copy. Ten or more copies to same address, 5 cents a copy. Back numbers more than six months old, 25 cents.

In requesting change of address, please give your old address as well as the new one, at least two weeks before change is to become effective.

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Cable address: Scienserve, Washington.

New York office: 310 Fifth Avenue, CHickering 4-4565.

Entered as second class matter at the postoffice at Washington, D. C., under the Act of March 3, 1879. Established in mimeographed form March 18, 1922. Title registered as trademark, U. S. and Canadian Patent Offices. Indexed in Readers' Guide to Periodical Literature, Abridged Guide, and in the Engineering Index.

The Science Observer, established by the American Institute of the City of New York, is now included in the SCIENCE NEWS LETTER.

The New York Museum of Science and Industry has elected SCIENCE NEWS LETTER as its official publication to be received by its members.

Member Audit Bureau of Circulation. Advertising Representatives: Howland and Howland, Inc., 393 7th Ave., N. Y. C., PEnnsylvania 6-5566; and 360 N. Michigan Ave., Chicago, STAte 4439.

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PHYSICS

New Electron Spectrometer May Identify Molecules

Submicroscopic Objects, "Seen" for First Time With Electron Microscope, Will Now Be Analyzed

SHOOTING an invisible beam of electrons through a tiny, invisible specimen may eventually permit identification of individual molecules.

The first electron spectrometer, an instrument for finding the composition of such small bits of matter, is being completed by Dr. Albert Prebus at Ohio State University. Dr. Prebus, with coworkers, is also noted for having built the first electron microscope to be used in America.

Pictures taken under the electron microscope, like those in the family album, give a physical portrait but seldom reveal the true nature of the individual. Therefore, submicroscopic objects, seen for the first time by using the powerful electron microscope, will now be examined with the spectrometer to determine their composition and properties.

A better chemical understanding of the mysterious viruses is likely. And it should be possible to follow the reactions which occur in the battle between our virus enemies and the antibody defenses of the blood. Disease-producing germs are in for a similar scrutiny.

Just how drugs in turn attack the germs can be investigated by the analyzing beam of electron particles. What makes the sulfa drugs so effective, for example, is one of many such medical controversies.

Rare earth metals are to be used in one of the first research applications of the new device. These rare earths can be recognized even when mixed with other complex materials. Thus they serve as identification tags when attached to other substances. Adventures of these tagged materials in their associations with minute plant and animal organisms can then be followed by using the new spectrometer.

The main advantage of such experiments is that the sample of material can be thousands of times smaller than that required by the best chemical methods. About a hundred thousand such tests can be made from material piled on the head of a pin.

While examining such small particles under the electron microscope, Dr. Prebus got the idea for the spectrometer from a defect in the microscope's operation. This is how it happened.

A beam of electrons is used here instead of light to form the magnified image. As these particles of electricity pass through the specimen, they collide with the chemical elements present. Dr. Prebus found that this causes some of the electrons to lose part of their energy and not focus properly. These "tired" electrons were a nuisance.

But this loss of energy, it was observed, is always the same for a particular substance. On this basis the electron spectrometer was constructed. By measuring the losses of energy after shooting electrons through a specimen, chemical composition can be interpreted.

Science News Letter, June 27, 1942

ASTRONOMY

"David" Comet Loses Fight With "Goliath" Jupiter

A COMET with its best days behind it and a story of a David and Goliath battle of the heavens has been unearthed by astronomers at Harvard Observatory, according to a paper on Comet Whipple 1933f presented by Richard N. Thomas at the American Astronomical Society meeting in New Haven. This comet was discovered by Dr. Fred L. Whipple, of Harvard, in 1933; it is an inconspicuous object, but in 1922 and prior years it traveled close to Jupiter, and the tremendous attraction of that planet, the largest in the system, altered its orbit greatly.

Mr. Thomas reported that in 1922 the orbit of this interesting comet was nearly circular, as comets' orbits go, and almost as large as that of Jupiter. But when the comet and Jupiter traveled together for a time the orbit of the comet was

PROTECTION

A life vest for U. S. Army Air Corps flyers is here demonstrated by Elaine Eversole, speed swimmer. Deflated, the vest can be worn without interfering with the movements of the wearer. Pulling a cord at the bottom of the vest punctures a carbon dioxide cartridge which inflates it in less than three seconds. Even if the wearer is unconscious, the vest will hold his face above water. It is manufactured for the Army Air Corps by the Firestone Tire and Rubber Company.

affected tremendously, so that now the comet alternately comes within 270 million miles of the sun and goes as far away as 480 million miles, nearly twice as far. This latter is Jupiter's average distance from the sun, so there will be future occasions when the comet and the mighty planet will wage their battle.

The comet will always lose. It lost three years of its "life" in 1922, so instead of taking 10 years for a trip around the sun, it now takes only about seven years. Before 1920 its history is uncertain, but an astronomer, with time on his hands, can compute backwards and find out whether or not this comet may have had a much larger orbit than Jupiter's and possibly have been "captured" by the Goliath of the solar system.

Science News Letter, June 27, 1942

GENERAL SCIENCE

Nine Girls, 31 Boys Awarded Science Talent Search Trips

Ages of Winners Range From 15 to 18; More Than Half Stood at Head of Their High School Senior Classes

NINE girls and 31 boys have been invited to Washington, July 13-15, to compete for twenty Westinghouse science scholarships in the Science Talent Search conducted by Science Clubs of America, sponsored by Science Service.

The names of the trip winners were selected as the result of a strenuous competition in which superior seniors of all secondary schools in the United States were invited to participate. The 40 winners were selected from more than 10,000 entrants and some 3,200 who completed a science aptitude examination, submitted recommendations and scholarship records and wrote an essay on "How Science Can Help Win the War."

The trip winners come from 31 localities in 13 states. Entries were received from every state in the union.

Twenty of those who come to Washington the middle of next month on the all-expense trips will be selected for scholarships which will allow them to go to any college of their own selection, so that they may continue science or engineering training. One boy and one girl will be awarded $2,400 Westinghouse Grand Science Scholarships ($600 a year for four years), while 15 boys and 3 girls will be awarded $200 Westinghouse Science Scholarships.

Selected without regard to geographical considerations, the results showed that three high schools among the more than 25,000 have more than one winner among the 40. The Herbert Hoover High School at Glendale, Calif., furnished three trip winners, all boys, the Shorewood High School at Shorewood, Wis., had among the winners a boy and a girl, and Walton High School in the Bronx, New York City, placed two girls in the list of winners. Evansville, Ind., also furnished two winners, a boy from Reitz Memorial High School and a girl from Benjamin Bosse High School.

More than half, 52.4%, of the Science Talent Search trip winners stood first in their high school classes. Twenty-two of the winners were members of science clubs and six of them were club presidents.

The ages of the trip winners range from 15 to 18, with the average age 16 years, six months.

Of the trip winners, 14 intend to study chemistry, 10 are headed for engineering careers, 8 have selected physics as their field of study, 7 will study some field of medicine or biology, while one is headed for higher studies in astronomy.

The proportion of boys and girls who submitted completed entries in the Science Talent Search determined the distribution of boys and girls among the trips awarded. Girls accounted for 22% of the entries. The scholarships, with the exception of the two grand scholarships, will be distributed among boys and girls in the same ratio.

Science Talent Search judges have authorized the issuance of a list of 260 boys and girls who, in the Science Talent Search, have been awarded honorable mentions. A copy of this list will be sent to any official of an institution of higher learning who desires it.

"A major need for America today is the discovery and development of scientific ability among boys and girls now in high school," the Science Service announcement states. "Real ability for creative research and engineering is rare. Many who do not now have the opportunity to develop their scientific talents will be discovered and made available for America's future progress through this Science Talent Search.

"This is more than a scholarship contest. It is a major step toward making available potential scientific talent to important tasks in war and peace. Within the next five years, either in war or peace, boys and girls now in high school must begin to take leadership in scientific research and engineering."

The Science Talent Search is conducted by Science Service as one of the activities of Science Clubs of America. Awards are provided and the Science Talent Search made financially possible by the Westinghouse Electric & Manufacturing Company, a leader in scientific research, engineering and manufacture in the electrical industry, as a contribution to the advancement of science in America.

Science News Letter, June 27, 1942

CHEMISTRY

Plants, Like Steel, Require Many Chemicals

HEALTHY PLANTS, like good steel, need the addition of minute amounts of a number of chemical elements. Some of them are the same as those required for modern steel making, including manganese, molybdenum and copper.

The story of these "micro-nutrients" was told by Prof. D. R. Hoagland of the University of California, in his address as president of the Pacific Division, American Association for the Advancement of Science.

The need of plants for these minute traces of certain elements was completely unknown until a few years ago, and even now it is not certain that the list of micro-nutrients is complete. Of most of them, only a few parts in a million of soil solution are needed to maintain plant health, yet without them the plant sickens and perhaps dies.

Lack of some of these elements produces plant diseases that might formerly have been ascribed to the attack of submicroscopic viruses. Fruit trees in soils without zinc, for example, produce symptoms known as "little leaf" and "mottle leaf." Most soils have sufficient quantities of the micro-nutrient elements for all practical purposes, but where they are lacking it is important to detect which ones are short and to remedy the defect.

Science News Letter, June 27, 1942

GENERAL SCIENCE

Science Talent Search Washington Trip Winners

The following 9 girls and 31 boys (proportion determined by proportion of boys and girls entering the contest) are being invited on all-expense trips to Washington, D. C., July 13-15, 1942, where one boy and one girl will be awarded $2400 Westinghouse Grand Science Scholarships and 15 boys and 3 girls will be awarded $200 Westinghouse Science Scholarships.
(Indicates girls)*

CALIFORNIA

Glendale — Calhoun, William Denman 16 Herbert Hoover High School
Kofahl, Robert Eugene 17 Herbert Hoover High School
Phillips, Robert Edward 18 Herbert Hoover High School

IDAHO

Lewiston — Eastman, William Byron 16 Lewiston Senior High School

ILLINOIS

Chicago — Korn, Hugo 16 Tuley High School
Freeport — Ousley, Joseph Livingstone 17 Freeport High School
Oak Park — *Jacobson, Janet Mary 16 Oak Park High School

INDIANA

Evansville — Barthel, Paul Joseph 18 Reitz Memorial High School
*Pease, Evelyn Alice 17 Benjamin Bosse High School
Hammond — *Ross, Jean Carol 17 Hammond High School

KANSAS

Kansas City — Hoover, Richard M. 17 Argentine High School

MINNESOTA

St. Paul — Larimore, Wayne Homer 18 Murray High School

NEW JERSEY

Boonton — Winsor, Paul, III 17 Boonton High School
Salem — Newell, James 18 Salem High School

NEW YORK

Camden — Worthington, William Dorrance 17 Camden High School
Farmingdale — *Prajmovsky, Marina 18 Farmingdale High School
Floral Park — Halberstadt, Nathaniel Herbert 16 Sewanhaka High School
Frewsburg — Davis, Homer Frederick 18 Frewsburg High School
Hinsdale — Dehnkamp, Gilbert Christopher 16 Hinsdale Central High School
New York — Avallone, Eugene Attilio 16 High School of Commerce
Greiff, Robert 16 Brooklyn Technical High School
Hollander, Lester Blessing 15 Bronx High School of Science
Linder, Seymour 16 James Monroe High School
*Meirowitz, Beatrice 16 Walton High School
*Pike, Carol Ruth 15 Walton High School
Niagara Falls — Swartz, Clifford Edward 17 Niagara Falls High School
Rochester — Presberg, Jack Eugene 17 Benjamin Franklin High School
Schenectady — White, Donald Robertson, 17 Mont Pleasant High School
Sea Cliff — Brown, Barton 17 Sea Cliff High School
Troy — *Williams, Mary Ann 17 Troy High School
Utica — Karo, Wolf 18 Utica Free Academy

NORTH DAKOTA

Park River — Borgeson, Warren Thomas 17 Walsh County Agricultural School

OREGON

Salem — Voigt, Allan Earl 17 Salem High School

PENNSYLVANIA

Mount Penn — *Wien, Julia Anne 17 Mount Penn High School
Pittsburgh — Michener, John William 18 Taylor Allderdice High School

WEST VIRGINIA

Weston — Lynch, Robert Lee 16 Weston High School
Wheeling — Smith, Harlan James 17 Wheeling High School

WISCONSIN

Lakemills — Cranefield, Paul Frederic, Jr. 17 Lakemills High School
Shorewood — *Jones, Betty-Jane 18 Shorewood High School
Teschan, Paul Erhard 18 Shorewood High School

● RADIO

Saturday, July 4, 1:30 p.m., EWT

"Adventures in Science," with Watson Davis, director of Science Service, over Columbia Broadcasting System.

A report on "How Science Can Help Win the War" from the Science Talent Search.

Tuesday, June 30, 7:30 p.m., EWT

Science Clubs of America programs over WRUL, Boston, on 6.04, 9.70 and 11.73 megacycles.

One in a series of regular periods over this short wave station to serve science clubs, particularly in the high chools, throughout the Americas. Have your science group listen in at this time.

ASTRONOMY

Invisible Star Discovered By Photographic Means

By C. A. FEDERER, JR.

THE well-known double star in Mu Draconis has an invisible companion besides its two visible components, Dr. K. Aa. Strand, of Sproul Observatory, Swarthmore College, reported to the American Astronomical Society meeting in New Haven.

Mu Draconis was discovered as a double star with two equally bright components by Sir William Herschel, in 1779. The motion of these two visible stars has been followed by double-star observers and, from the path the two suns have described since 1779, it can be said that they revolve around each other in about 1,500 years.

The presence of the third star was discovered by Dr. Strand from a regular fluctuation from the expected motion, having a period of three years. This fluctuation is caused by the gravitational attraction of the unseen star as it revolves around one of the visible stars, but only the accurate photographic observations made with the large Sproul telescope have revealed these fluctuations.

Mu Draconis is about 100 light-years away and has a mass about 3½ times the sun's, while the unseen companion is a dwarf star with a mass of one-half the sun's. The two bright stars are separated by about 70 times the distance of the sun from the earth, or about 6.5 billion miles; whereas the newly-discovered companion revolves around one of the stars at only 250 million miles.

In 1940 the discovery of a similar invisible companion to the star Zeta Aquarii was reported by Dr. Strand. (See SNL, Nov. 30, 1940).

ASTRONOMY

Bright Star Sextette

But Only One Planet Is Left in July Evening Sky And That Is Very Inconspicuous, Low in Northwest

By JAMES STOKLEY

SIX BRIGHT stars, of the astronomer's first magnitude, decorate the evening skies of July, and are shown on the accompanying maps. These depict the heavens at 11:00 p. m., war time, on July 1, and an hour earlier on the 15th. The stars would be arranged the same way an hour earlier still—that is at 9:00 p. m. on July 30, but then the sky will hardly be dark enough to see them.

Vega, in Lyra, the lyre, is the most brilliant of the July sextette. It is high in the east and, with nothing else so brilliant, especially in that vicinity, it is easy to locate. Second brightest star is Arcturus, in Bootes, the bear driver, to the southwest. This can be located by following southward the curved line of the handle of the Great Dipper, which is in the northwest.

Altair in Aquila, the eagle, ranks third in brightness, and can be located in the southeast, made easy to identify because of the two fainter stars which attend it, one just above, the other below. Fourth in order of brightness, is Spica, in Virgo, the virgin, to the southwest. The same curved line from the dipper's handle, that led us to Arcturus, takes us to Spica when continued farther.

The star in place number five is very easy to find, and it is one that seems symbolic of the evening skies of summer. This is Antares in Scorpius, the scorpion, low in the south. Distinctly red in color, Antares can be recognized without difficulty. Also, it is part of a very striking group of stars, ending in a hook-shaped figure that forms the scorpion's tail. This is one of the few constellations in which there is actually some resemblance between the star arrangement and the thing they are supposed to represent.

Cross Now on Side

Number six is Deneb, in Cygnus, the swan, another familiar group that is sometimes called the northern cross, and is seen in the northeast. Since the cross is now on its side, however, it is not quite as easily recognized as it will be next autumn when the cross stands majestically vertical in the west. In the figure of the bird Deneb is the tail and the crossarms are its outstretched wings in flight.

Only one planet is left in the July evening sky, and that is very inconspicuous. Mars now receding to the most distant parts of its orbit, far beyond the sun, is of the second magnitude, and visible, if you can find it, low in the northwest. However, around July 6, Mercury will be seen in the east before sunrise, and also, even brighter, will Venus be seen, low in the east as morning twilight breaks. Saturn, though fainter, is also a morning star and Jupiter will become one at the end of the month.

Sun Farthest Away

During July, when the noonday sun is so hot, it seems much closer to us than it did last January. But actually, this is the time of year when the earth is in "aphelion," that is, farthest away from the sun. "Perihelion," the time when it was nearest the sun, came in January. Then, on the second, sun and earth were only 91,341,000 miles apart, while July 6 finds them separated by 94,421,000 miles.

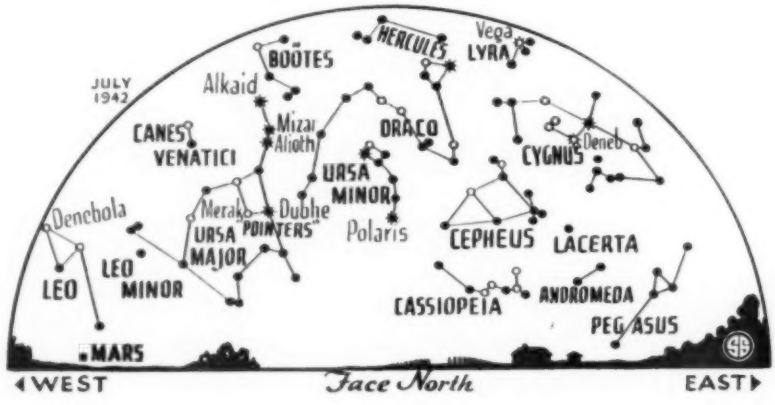
It might seem that this added distance, more than 3,000,000 miles, might make the sun appreciably less intense, and so it would, other things being equal. But other things, most emphatically, are not equal, and they more than counteract the greater solar distance. Mainly the warmth of summer is a question of the sun's maximum height in the sky during the day. In June and July it climbs so high that its rays fall nearly vertically on the ground, and they are most concentrated. But in December when the sun, even at noon, is low the rays strike the earth at a grazing angle, and a beam of sunlight and heat, let us say, a yard square, may be spread over more than two square yards of ground.

Above Horizon Longer

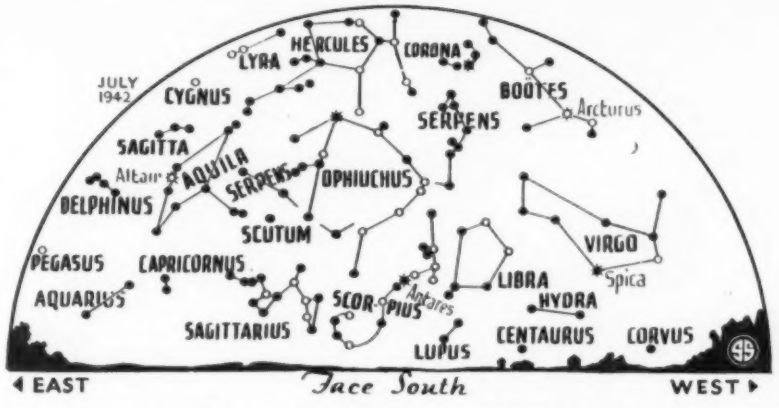
Another factor is that the sun at this time of year is above the horizon longer —the days are longer and the nights are shorter, so it has that much more time in which to produce its heating effect.

Turning now to the night-time sky, we can see not only the constellations containing the first magnitude stars, which were described above. There are also fainter constellations, many of which, like those already mentioned, date back to very early times. But the maps this month show four groups of which this is not true. Of these we know exactly who introduced them and when he did it.

To early astronomers, the only way of designating the position of a particular celestial object was to give its place with relation to the constellation figure. In some parts of the sky there are very few naked-eye stars, and so the ancients left these blank. But when the telescope was introduced in the 17th century stars were seen in these vacant areas. The first really big observatory was that established in Danzig, Poland, by the brewer, Johannes Hevelius, and he must have felt keenly the absence of constellations in certain parts of the sky. The result was that, in 1690, he published a new star atlas, with beautifully engraved plates, in which he introduced some new figures to fill up the holes.



Scutum, the shield, which represented the shield of the Sobieskis, the ruling family of Poland; Canes Venatici, the hunting dogs; Leo Minor, the lesser lion, and Lacerta the lizard, are those indicated on the maps. Another is Vulpecula, the fox, which is not shown, but lies just above Sagitta, the arrow. A sixth is Sextans, the sextant, now below the horizon and near Leo. Hevelius also introduced Cerberus, the three-headed monster, which he had Hercules holding. This alone of the seven is not recognized today; its stars are now included in Hercules.



Celestial Time Table for July

Friday, July 3, 7:00 p.m., Venus passes Saturn. Sunday, July 5, 4:58 a.m., Moon in last quarter; 8:00 p.m., Earth farthest from sun, 94,421,000 miles. Monday, July 6, 6:00 a.m., Mercury farthest west of sun, visible for a few days about now before sunrise. Thursday, July 9, 4:39 p.m., Moon passes Saturn. Friday, July 10, 7:13 a.m., Moon passes Venus; 8:00 p.m., Moon farthest, distance 252,500 miles. Saturday, July 11, 11:30 a.m., Moon passes Mercury. Sunday, July 12, 6:01 a.m., Moon passes Jupiter. Monday, July 13, 8:03 a.m., New moon. Wednesday, July 15, 7:46 p.m., Moon passes Mars. Tuesday, July 21, 1:13 a.m., Moon in first quarter. Sunday, July 26, 5:00 a.m., Moon nearest, distance 223,800 miles. Monday, July 27, 3:14 p.m., Full moon. Tuesday, July 28, after midnight, Meteors of delta Aquarid shower.

Science News Letter, June 27, 1942

ASTRONOMY

Teaching of Air and Marine Navigation Together Urged

Astronomer Stresses Need To Teach Subject as an Operational Routine; Use Hydrographic Office Terms

THE importance of unified and simultaneous instruction in air and marine navigation, and the importance of training college students in the operational routine of navigation rather than in old-fashioned principles were stressed by astronomers discussing the teaching of navigation at the American Astronomical Society meeting in New Haven.

Dr. John Q. Stewart, of Princeton University, said that pretraining in navigation of the better-equipped college students had received the approval of high officials in the Navy. Service schools do not have time to insure the thorough mastery of navigation operations which are essential to avoiding disaster during military maneuvers, and they are also in great need of instructors in the paperwork of navigation.

College courses on navigation should include the latest methods of air navigation along with the older marine methods, Dr. Stewart said. This is particularly important in view of the growing cooperation between surface ships and air forces, which requires mutual understanding among navigators.

"It is not necessary to have a preliminary course in trigonometry and logarithms," Dr. Stewart stated, "far less in spherical trigonometry."

He stressed that navigation must be taught as an operational routine. "Graphical methods, linear interpolations, and judgment of tolerances should be taught well," he said.

Standard Hydrographic Office terminology ought to be used by all books and teachers of navigation, regardless of whether in air or marine phases. Dr. Stewart regards it as troublesome that manuals of navigation have been written for civilian and army pilots which deviate unnecessarily from standard methods and nomenclature. He recommended that the college teacher use Bowditch, the navy aircraft manual, the maneuvering board manual, and Dutton's book on navigation.

Relative motion was stressed by Dr. Newton L. Pierce, also of Princeton, as especially important in modern warfare. Navigation also includes piloting, dead reckoning, radio navigation, celestial navigation, and problems. Of these, only celestial navigation is strictly astronomical, yet hundreds of astronomers are called upon to teach the entire subject in the war emergency. Their students, in turn, become instructors of civil air corps pilots, army and navy men, and in civil aeronautics courses.

"Relative motion," said Dr. Pierce, "has been under-emphasized and often badly garbled in the various texts which treat of it at all. It is true that relative motion has little use in peace time marine navigation. It is, however, of great importance in war time for fleet maneuvers, and is important at all times for the air navigator. However, this is not a subject the student easily understands, and therefore, it should receive considerable emphasis, particularly by vector solutions, which may be made easily and quickly. The Princeton astronomers recommended that the methods of solution of navigational problems used by the Service schools be followed, and that the air almanac be used in preference to the nautical almanac wherever possible.

Science News Letter, June 27, 1942

PUBLIC HEALTH

Health Service Officer Stricken By Rabbit Fever

DR. CHARLES ARMSTRONG, Senior Surgeon, U. S. Public Health Service, and Director of the Division of Infectious Diseases of the National Institute of Health, has been suffering from a severe attack of tularemia (rabbit fever) since May 25.

He was taken sick a few hours after arrival on an official visit to the Rocky Mountain Spotted Fever Laboratory at Hamilton, Mont., which is one of the

federal health service activities now under his direction. He did not get tularemia at the Hamilton laboratory and Public Health Service officials have no idea where he did pick up the infection. He had not been working on this disease. He is now "getting along all right" and officials are not worried about his condition.

Discovery of the cotton rat as a suitable laboratory animal for studies of infantile paralysis; discovery of the brain disease of mice and men, choriomeningitis; studies on parrot fever (psittacosis), and botulinus toxin, St. Louis and other varieties of encephalitis, dengue fever and studies leading to improved methods of vaccinating against smallpox, are among the disease-fighting achievements for which Dr. Armstrong is known.

Science News Letter, June 27, 1942

ENGINEERING

Reduction of Smoke and Smell From Diesel Engines Studied

Can Be Reduced To Insignificant Proportions By Use of Fuels of Higher Cetane Number and Volatility

OBNOXIOUS smoke and odor in the exhaust gases of Diesel engines, now increasingly used in truck and bus service, can be reduced to insignificant proportions by use of fuels of higher cetane number and higher volatility, and selection of a fuel adapted to the engine used. (The cetane number is to a Diesel fuel what the octane number is to gasoline).

This conclusion was reached, after testing 13 commercial fuels and 60 specially made up fuels in several different engines, by R. S. Wetmiller, engineer of the Texas Company, and Lieut. L. E. Endsley, Jr., formerly an engineer with the Texas Company. Their findings were reported at the meeting of the Oil and Gas Power Division of the American Society of Mechanical Engineers.

Of course the engine must be in first class condition, the engineers specified. Improper adjustments, worn or dirty fuel injectors, or any other lack of proper maintenance can completely overshadow any benefits derived from use of a premium fuel.

However, while increase in cetane number and in volatility of the fuel will diminish smoke and smell in the exhaust, they also decrease the power and economy of the engine, the engineers found. The solution must therefore be a compromise among the ends desired.

Prevention of excessive smoke and smell is especially important in view of the fact that they are worse when the engine is idling or accelerating after idling, operations that occur most frequently in our crowded city streets.

Finally, the engineers expressed hope that future engine design might obviate the necessity for "tailor made fuels" and precise maintenance.

Science News Letter, June 27, 1942

NUTRITION

Dehydrated Sweet Potato Added to Army's Diet

SOLDIERS from the South aren't going to be deprived of their favorite sweet 'taters even on the far side of thousands of miles of salt water. A new order for a million pounds of dehydrated sweet potatoes has been awarded to the Gilbert C. Wilson Laboratories which have just completed an initial order of 250,000 pounds for the Army. Since dehydrated vegetables take on somewhere in the neighborhood of eight or ten times their weight in water, when they are soaked up and cooked, this million-and-a-quarter pounds ought to fluff up to a fair-sized dishful for Southern boys overseas.

Science News Letter, June 27, 1942

PUBLIC HEALTH

Vaccination Justified for Horse Sleeping Sickness

VACCINATION of humans against horse sleeping sickness (equine encephalomyelitis) "is justified in the face of an epidemic," Dr. R. Walter Schlesinger, Dr. Isabel M. Morgan and Dr. Peter K. Olitsky, of the Rockefeller Institute for Medical Research, declare. (*Journal, American Medical Association,* June 20.)

Apparently good results have been obtained, they point out, in vaccinating horses against this disease, which last summer and fall caused more than 3,000 human cases. Similar good results might be obtained in vaccinating humans, they believe, as a result of their experiments with rabbits and mice.

The virus of this disease attacks the brain but, since it is probably spread by mosquitoes, it gets into the blood first and spends a little time there before being carried to the brain. If during this period sufficient antibodies to fight the encephalitis virus can be mobilized in the blood, damage to the brain can be prevented, the mouse and rabbit studies suggest.

Grown-up animals can make their own antibodies in time to prevent virus damage to their brains, but young ones cannot, the experiments showed. This corresponds with the observation that in humans all outbreaks of equine encephalitis except one were characterized by a relatively high occurrence of frank cases among children.

Vaccination would speed up mobilization in the blood of antibodies to fight the encephalitis virus and might therefore be expected to ward off an attack or reduce its severity.

Science News Letter, June 27, 1942

CHEMISTRY

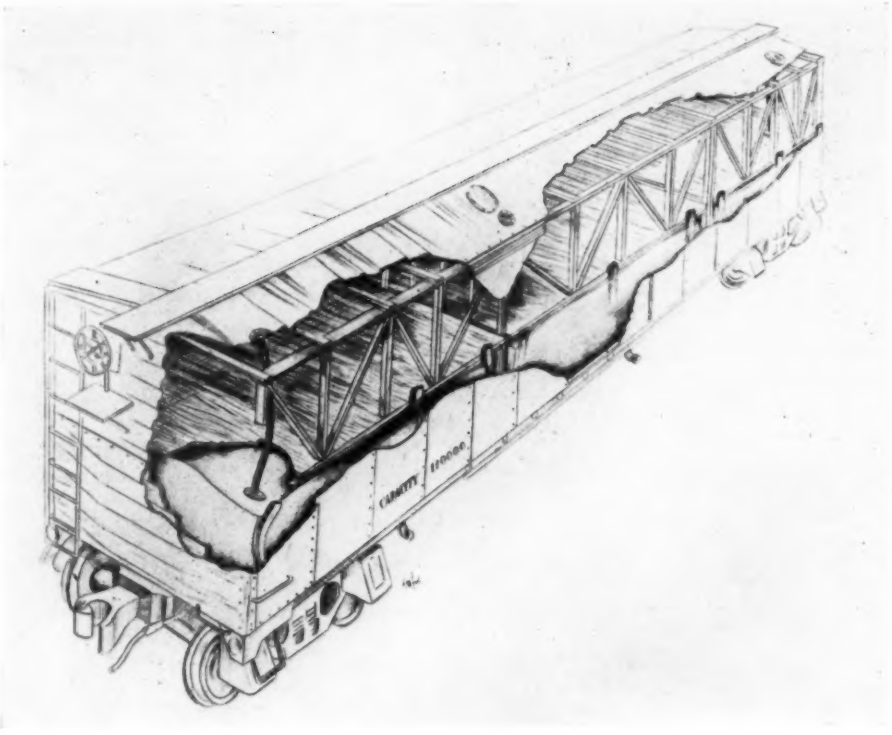
"Laundries" Will Wash War Gases From Food

GAS ATTACKS will not destroy England's food supply. Should the Axis choose to conduct gas warfare, food "laundries" throughout the British Isles stand ready to decontaminate any foodstuffs exposed to gas. In concrete-floored, metal-equipped rooms trained civilians are ready to combat effects of any of the fourteen known types of war gases, from deadly phosgene or lewisite to relatively harmless tear gas.

In reception chambers of the laundry, staff members will trim off the outside of meats and fats. Then these and other foods will move into airing rooms. Canned foods, affected only by liquid gas, will be immersed in water treated with a bleaching agent. Each can will be indelibly coded, to identify its contents after the paper label has been washed off.

When decontaminated, food will move to a sampling room, where tests will prove its complete fitness for human consumption.

Science News Letter, June 27, 1942



GASOLINE IN BAGS

Box cars, ordinary motor trucks, and wooden barges, would be turned into tankers if the proposed use of synthetic rubber bags for gasoline transportation proves practical. It is proposed by the manufacturer of the synthetic "Mareng cells," the Glenn L. Martin Company. The cells were originally made for carrying gasoline in military airplanes. The cell can be stuffed into a small aperture in a wing and then filled with fuel—expanding to fill the whole wing cavity. In case it is punctured in battle, the holes tend to close and prevent the loss of the fuel. The damaged cells can be pulled out for patching while others are stuffed in their place. Material for their manufacture is abundant, it is claimed, and manufacturing capacity already available.

METALLURGY

New Electrostatic Device Picks Tin From Worthless Rock

See Front Cover

TIN for America's wartime needs may presently be coming from ore deposits in the South, too low-grade for ordinary methods of extraction, if a new device developed in the Westinghouse laboratories operates as successfully on a large scale as it does experimentally. In small-scale tests, it has separated out the worthless rock from the tin so well that an ore of only 1.5% tin content was converted into a concentrate of 70% tin —which is quite suitable for smelting.

The machine (shown on the front cover of this week's SCIENCE NEWS LETTER) is patterned after electrostatic cleaners that take dust particles out of the air, furnace gases, etc., by charging them with static electricity. Such devices have been in use for a long time. They take advantage of the attraction between bodies carrying opposite charges—the kind of thing that happens when your hair "follows" the comb.

In the new ore-separating process, the mineral is first ground to the consistency of fine sand. Then it is poured down through a tower, falling toward a slowly rotating metal drum. Just before the particles strike the drum, they receive a charge of static electricity from a series of fine wires.

The tin particles, being good conductors, promptly lose their charges to the metal of the drum, and drop off before they reach the bottom of the turn. The poorly conducting rock particles retain their charges and stick to the drum, until they are pulled off as they come opposite a second series of wires, charged with electricity of opposite sign.

The one drawback in the method is the necessity for having the particles powder-dry, because moist particles cannot be made to carry a workable static charge. Tried experimentally in the past on low-grade iron and gold ores, it worked all right, but proved economically impractical because of the high cost of drying the material. But with tin on a hang-the-expense basis, it may prove worth while to build some large-scale machines to concentrate our domestic low-grade ores.

Science News Letter, June 27, 1942

MEDICINE

Deferred Duty Status for R.O.T.C. Medical Students

MEDICAL students who have completed advanced Reserve Officers' Training Corps courses will have a chance to complete their medical course before being called to active duty, according to a War Department announcement.

If they have been accepted as matriculants in an approved medical school, they will be commissioned second lieutenants in the U. S. Army and placed on deferred duty status. They will be commissioned in the arm or service in which the training was received rather than in the Medical Administrative Corps.

Those who have completed all requirements for the commission before entering medical school except the practical training at the appropriate service school will be required to attend the service school if the date of their entrance into medical school permits. If it does not, they will be permitted to withdraw from their R.O.T.C. course contracts, will be commissioned as second lieutenants in the Medical Administrative Corps and will be placed on deferred duty status until their medical training has been completed or discontinued.

Science News Letter, June 27, 1942

To combat America's paper shortage, *paper shavings* produced in trimming books and magazines are now graded and reused in manufacturing more paper.

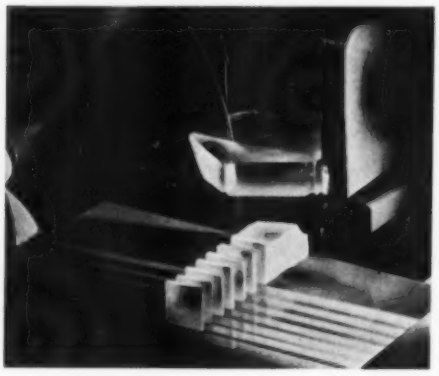
New Machines And Gadgets

Novel Things for Wartime Living

A cigaret case and lighter combined is the subject of a recent patent. A zig-zag spring in the flat case keeps the cigarettes always near the top. When the case is opened, the topmost cigarette is tilted up so that one end is accessible to the mouth of the smoker. The other end is held adjacent to the lighter. The cigarette can also be removed with the fingers without lighting if desired.

Silicate adhesives are found superior to other adhesives in making cartons in that they penetrate just enough to give a good hold but not enough to make the board soggy and weak. Also they can be made in a number of grades suitable for different materials. They are made from sodium silicate of which there is at present an adequate supply.

Airplane instrument lights are regulated in brightness by two thin polarizing disks placed between the bulb and the lens. One is fixed; the other can be rotated by turning. When the polarizing disks are crossed, the light is almost completely extinguished. This saves weight, space and a lot of wiring when electrical resistances are used to dim the lights. It is very important to dim the lights at night so that the pilot will not be blinded as he shifts his eyes from the darkness outside to the panel board inside.



The saw in the illustration is slicing a four-inch quartz crystal like a loaf of bread. The slices are used in broadcasting equipment to keep the station accurately on its assigned frequency. Quartz is harder than glass, yet the saw penetrates smoothly and easily because its rim is studded with diamonds—small rough ones not suitable for gems. Many square inches of hard crystals can be sawed before the diamonds must be renewed.

When typewriters again become generally available, don't be surprised if you see some with their frames built of synthetic plastic material instead of metal. Such a typewriter, of German make, was recently shown in an "Ersatz Fair" held in Zurich, Switzerland. It is said to be considerably lighter than a metal-framed machine of the same size, but strong and durable enough for all practical purposes.

Handy matches for the cigarette is a problem still engaging the attention of inventors. One inventor stuck the matches on the package, another stuck a match on each cigarette. But now comes the simplest of all. The package is simply provided with a pocket in which an ordinary book of matches can be carried. This invention has been patented.

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, *1719 N St., N. W., Washington, D. C., and ask for Gadget Bulletin 110.*

Science News Letter, June 27, 1942

AERONAUTICS

Auxiliary Turbines for Rocket Aircraft Patented

ROCKET-PROPELLED airplanes of the future will use turbine-driven propellers to push themselves up through the atmosphere as far as it is dense enough to give the propellers some "grip." Once far up in the thin-aired stratosphere, these auxiliary flying means will be cut loose and permitted to float back to earth on parachutes, while the aircraft roars meteor-like on its high-speed way, pushed by the direct blast of the rocket jets.

This flight of the future is envisioned by Dr. Robert H. Goddard of Roswell, N. M., in an invention on which he has just received U. S. patent 2,286,908.

The auxiliary turbines, turning propellers, are desirable on rocket craft, Dr. Goddard explains, because at slow speeds in our lower, dense atmosphere rocket propulsion is inefficient and wasteful of fuel. At these levels propellers work better. The scientist-inventor proposes to drive his turbines with the rocket blast itself, which would work very much as steam does in the more conventional type of turbine.

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Policemen and postmen in Washington, D. C., are walking their beats on *reclaimed rubber* heels these days, to test quality and durability of the experimental substance.

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ENTOMOLOGY

NATURE RAMBLINGS by Frank Thone

Ways of the Ant

WAR at sight is not the rule in the ant world but rather the exception, despite widespread belief to the contrary, declares Dr. Laurence J. Lafleur of New York. When two stranger ants meet, instead of instantly beginning battle, they usually merely back off, turn aside a little, and go their respective ways.

"Except when slave-making ants make raids on their neighbors, and when spring competition for extra land causes wars, the ants of the northern states are a peaceful lot," he states (*American Naturalist,* January-February).

Even the slave-making species are not necessarily murderous in their raids, Dr. Lafleur points out. He cites the observation of the late Prof. William Morton Wheeler of Harvard University, who watched such a raid in progress. Slave-making ants in such raids are concerned only with the pupae or immature infants of the species they kidnap and carry off to be their servants. In the attack described by Dr. Wheeler, the marauders, much bigger and stronger than their victims, nevertheless did not kill them but only carried the defenders out of the nest and set them down outside, uninjured.

Another struggle described by Dr. Lafleur was over a herd of aphids or "ant cows," whose sweet body-secretion is much prized by many species of ants. Although two rival ant armies were staging a rough-and-tumble contest, they refrained from tearing each other to pieces. Some of them even took time out to go and "milk" the aphids.

In still other cases, groups of stranger ants, even of different species, were forcibly mixed to see what they would do. Sometimes they fought for a while, then became a united, cooperating group. Sometimes the cooperation ensued without any preliminary fighting.

There is something rather ridiculously human about the relative pugnacity of ants. The bigger they are the more good-natured they are likely to be. It is the smaller ants that seem to find it necessary to assert their egos through aggressiveness and truculence.

"Among men," comments Dr. Lafleur, "the pacific nature of the powerful and intelligent arises from their sense of security, while the truculence of the physical, mental or economic underdog is the product of an inferiority complex. There is every appearance that this is true of dogs and ants as well as of men, and I see no reason to disbelieve these appearances."

Science News Letter, June 27, 1942

PSYCHOLOGY

Morale-Building Should Be Eliminated for Morale

THE BEST way to keep up American morale is to eliminate morale-building programs—letting high morale grow naturally from the successes of an efficiently organized nation, it was suggested by Dr. Robert E. Lee Faris, of Bryn Mawr College, to the Eastern Sociological Society meeting in Asbury Park, N. J.

A newspaper dispatch less than six months before the fall of France was quoted by Dr. Faris to show what attempts were made to build morale there. The report said: "It is realized that in this strange war, the morale of the troops may depend on the number of footballs available for distribution as much as on wholesome food and esprit de corps."

"It is doubtful," Dr. Faris commented, "that history will account for the defeat of France, however, by noting an insufficient number of footballs."

Three types of confidence were cited by Dr. Faris as to success: (1) a feeling that leaders, officers, and officials have the required ability to direct the effort (2) team spirit, or the conviction that those you are working or fighting with will also do their part adequately and (3) confidence in proper coordination.

"When the cooperating funtionaries agree on the aims, trust one another, and coordinate their actions well, the collective sentiment that is morale emerges," Dr. Faris concluded.

Science News Letter, June 27, 1942

Our Way of Life Is Rural

THE AMERICAN way of life which we are defending is in many of its most basic human manifestations still the rural American way, Dr. Adolph S. Tomars, of the College of the City of New York, told the meeting.

The wide variety of things, from fan dancers to social workers, educational activities and race-relations research, which are denounced by congressmen as "frills" have one thing in common—they are all city products, Dr. Tomars pointed out.

"Again and again," Dr. Tomars said, "we have seen rural prejudices and biases serve as stumbling-blocks for progressive measures, impeding the development of new collective social machinery and social reforms important in peace time and even more important in wartime. Here our rural survivals are a source of backwardness in facing the problem of war and war morale in an urban civilization.

"But we should recognize another side of this picture. Some of our complex urban and intellectualized values must recede into the background in wartime and may even become sources of weakness in morale, while many of the simpler rural elements, especially the rugged values of our frontier heritage, will come to the fore and become sources of strength. Thus we may confront a crowning paradox of our urban world. It may well be that in the severe ordeal before us, it will be the rural element surviving in our culture that will play a major role in seeing us through the crisis."

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Young rabbits, raised for meat, are ready for market three months after their parents are mated.

According to old Talmudic tradition, the only light on Noah's Ark was a *carbuncle,* which may have been a ruby, zircon or garnet.

•First Glances at New Books

ENGINEERING

HOW TO SAVE $100 A YEAR ON YOUR CAR—*Popular Mechanics,* 184 p., illus., $1.25. How to save money on oil, gas and tires will appeal to all of us, these days. In addition to that, there are innumerable short-cuts and gadgets for mechanics and motorists, which will be sure to interest the men of the family.

Science News Letter, June 27, 1942

TECHNOLOGY

RATIONED RUBBER, WHAT TO DO ABOUT IT—William Haynes and Ernst A. Hauser—*Knopf,* 181 p., $1.75. A timely tome telling about stocks today and supplies tomorrow, about the sources of crude and the making of synthetics and the uses of reclaimed rubber.

Science News Letter, June 27, 1942

AERONAUTICS

THE AIRCRAFT APPRENTICE—Leslie MacGregor—*Pitman,* 134 p., illus., $1.50. For school boys and girls.

Science News Letter, June 27, 1942

ASTRONOMY

FOUNDATIONS OF ASTRONOMY—W. M. Smart—*Longmans, Green,* 268 p., $4.20. A book intermediate between the popular exposition and the technical treatise. The circles, spherical triangles, and methods of astronomical calculations are explained especially in reference to navigation. The author believes the book should be helpful to young men in the air and naval forces as an introduction to their more technical manuals.

Science News Letter, June 27, 1942

NUTRITION

OUTLINES OF FOOD TECHNOLOGY — Harry W. Von Loesecke—*Reinhold,* 505 p., illus., $7.

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NUTRITION

MINERALS IN NUTRITION — Zolton T. Wirtschafter—*Reinhold,* 175 p., $1.75. A book for the lay public, written by a physician who is clinician at Mount Sinai Hospital and clinical instructor in medicine, Western Reserve University.

Science News Letter, June 27, 1942

ECONOMICS—PUBLIC HEALTH

FATIGUE OF WORKERS, Its Relation to Industrial Production — National Research Council, Comm. on Work in Industry—*Reinhold,* 165 p., $2.50. A study which emphasizes the importance of psychological factors such as the relation of a worker to his fellows, that have often been overlooked in previous attempts to determine the causes of fatigue and discomfort at work.

Science News Letter, June 27, 1942

AERONAUTICS

THE STORY OF THE AIRSHIP (Nonrigid)—Hugh Allen—*Goodyear Tire & Rubber Company,* 74 p., illus., $1. Written to show that helium-inflated blimps would be useful in the defense of our coasts against submarines.

Science News Letter, June 27, 1942

AERONAUTICS

THE HISTORY OF COMBAT AIRPLANES —Charles G. Grey—*Norwich University,* 158 p., $1. An unusual touch of interest is added to this historical account by the fact that the author who for 28 years was editor of "The Aeroplane", British aeronautical journal, was twice bombed out of his quarters while it was being written.

Science News Letter, June 27, 1942

MEDICINE

ENCEPHALITIS, A Clinical Study — Josephine B. Neal—*Grune & Stratton,* 563 p., $6.75.

Science News Letter, June 27, 1942

• Just Off the Press •

AIRCRAFT RIVETING, A Guide for the Student —E. B. Lear and James E. Dillon—*Pitman,* 118 p., illus., $1.25.

AMERICAN STANDARD DEFINITIONS OF ELECTRICAL TERMS; Approved, American Standards Association, Canadian Engineering Standards Association—*American Institute of Electrical Engineers,* 311 p., $1.

COLLATERAL READINGS IN INORGANIC CHEMISTRY, Second Series—L. A. Goldblatt, ed.—*Appleton-Century,* 198 p., $1.40.

ILLUMINATION AND VISUAL RANGE UNDER WATER—R. Ruedy—*National Research Council of Canada,* 32 p., 25c.

AN INTRODUCTION TO THE THEORY OF ELASTICITY FOR ENGINEERS AND PHYSICISTS (2d ed.)—R. V. Southwell—*Oxford Univ. Press,* 509 p., $10.

THE MODERN ATTACK ON TUBERCULOSIS—Henry D. Chadwick and Alton S. Pope—*Commonwealth Fund,* 95 p., $1.

MODERN THEORIES OF ORGANIC CHEMISTRY (2d ed.)—H. B. Watson—*Oxford University Press,* 267 p., $5.

THE PROBLEMS OF LASTING PEACE—Herbert Hoover and Hugh Gibson—*Doubleday, Doran,* 295 p., $2.

A SHORT COURSE IN QUALITATIVE ANALYSIS (rev. ed.)—F. E. Brown—*Appleton-Century,* 367 p., $2.50.

WEATHER ELEMENTS, A Text in Elementary Meteorology (rev. ed.)—Thomas A. Blair —*Prentice-Hall,* 401 p., illus., $4.

ECONOMICS

PRICE CONTROL, The War Against Inflation — Erik T. H. Kjellstrom and others — *Rutgers Univ. Press,* 171 p., $2.50. Describing experiences with price control in Sweden, England, Canada and Switzerland as evaluated by four economists.

Science News Letter, June 27, 1942

NUTRITION

THE HOME GUIDE TO MODERN NUTRITION—N. D. Phillips—*Longmans, Green,* 96 p., 50c. An excellent pocket-size book giving 90 balanced meals, showing the nutritional value of each food. Each meal is printed on a separate ticket, loose-leaf style.

Science News Letter, June 27, 1942

MATHEMATICS

MATHEMATICS DICTIONARY — Glenn James and Robert C. James—*Digest Press,* 281 p., $3. This volume covers the basic terms in pure mathematics and those ordinarily used in applications. Advanced technical terms are reserved for a later volume. The chief aim has been to convey the meaning of mathematical concepts to students, teachers, laymen and workers in other fields that require mathematics.

Science News Letter, June 27, 1942

CHEMISTRY

PIONEERS OF PLENTY, The Story of Chemurgy (new wartime ed.)—Christy Borth—*Bobbs-Merrill,* 410 p., $3.50. According to the author, the chemical age is replacing the machine age and solving the problems of unemployment and war, chiefly by finding chemical means of converting our farm surpluses into industrial commodities. Civilization is taking time out to put down a gangster, but should open its mind to these opportunities.

Science News Letter, June 27, 1942

ASTRONOMY

ESSENTIALS OF ASTRONOMY — John Charles Duncan—*Harper,* 181 p., illus., $1.85.

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PHYSICS

FROM COPERNICUS TO EINSTEIN—Hans Reichenbach; trans. by Ralph B. Winn—*Alliance Book Corp.,* 123 p., $2. A simple but scientific history of the ideas and discoveries that led to the theory of relativity and the modern conceptions of space and time. Some of the philosophical implications are also pointed out.

Science News Letter, June 27, 1942